

Assessment of Northern Hemisphere Snow Water Equivalent Datasets in ESA SnowPEX project

Kari Luojus (1), Jouni Pulliainen (1), Juval Cohen (1), Jaakko Ikonen (1), Chris Derksen (2), Lawrence Mudryk (2), Thomas Nagler (3), and Bojan Bojkov (4)

(1) Finnish Meteorological Institute, Arctic research, Helsinki, Finland (kari.luojuus@fmi.fi), (2) Environment Canada, Toronto, Canada, (3) ENVEO IT GmbH, Innsbruck, Austria, (4) European Space Agency, ESA, ESRIN, Frascati, Italy

Reliable information on snow cover across the Northern Hemisphere and Arctic and sub-Arctic regions is needed for climate monitoring, for understanding the Arctic climate system, and for the evaluation of the role of snow cover and its feedback in climate models. In addition to being of significant interest for climatological investigations, reliable information on snow cover is of high value for the purpose of hydrological forecasting and numerical weather prediction. Terrestrial snow covers up to 50 million km² of the Northern Hemisphere in winter and is characterized by high spatial and temporal variability. Therefore satellite observations provide the best means for timely and complete observations of the global snow cover.

There are a number of independent SWE products available that describe the snow conditions on multi-decadal and global scales. Some products are derived using satellite-based information while others rely on meteorological observations and modelling. What is common to practically all the existing hemispheric SWE products, is that their retrieval performance on hemispherical and multi-decadal scales are not accurately known. The purpose of the ESA funded SnowPEX project is to obtain a quantitative understanding of the uncertainty in satellite- as well as model-based SWE products through an internationally coordinated and consistent evaluation exercise.

The currently available Northern Hemisphere wide satellite-based SWE datasets which were assessed include 1) the GlobSnow SWE, 2) the NASA Standard SWE, 3) NASA prototype and 4) NSIDC-SSM/I SWE products. The model-based datasets include: 5) the Global Land Data Assimilation System Version 2 (GLDAS-2) product 6) the European Centre for Medium-Range Forecasts Interim Land Reanalysis (ERA-I-Land) which uses a simple snow scheme 7) the Modern Era Retrospective Analysis for Research and Applications (MERRA) which uses an intermediate complexity snow scheme; and 8) SWE from the Crocus snow scheme, a detailed physical snowpack model driven by meteorology from ERA-Interim. The model-based SWE datasets were available for the years 1980-2010. The GlobSnow SWE data are available for 1979-2014 and the NASA SWE for 2002-2011.

The intercomparison presented here was carried out by using ground-based snow course observations from the former Soviet Union and Russia and Finland as ground truth reference. For the first time an independent assessment has been carried out for the existing satellite- and model-based datasets in a coordinated fashion. The detailed results will be presented at the conference.